

I CLAIM

1. An environmental control system comprising rotary, ambient air compression means, first and further rotary air expansion means, and common rotary electrical drive means connected to drive them via a single shaft, wherein said rotary air compression means and said first rotary air expansion means are connectable in flow series to an enclosed space volume for the purpose of pressurising it, and said further rotary air expansion means is connectable to said enclosed space volume for the purpose of receiving said pressurised air therefrom so as to be rotatably driven thereby, in order to provide at least some of the power needed to rotate said common electrical drive means via said single shaft.

2. An environmental control system as claimed in claim 1 wherein a multi directional valve is positioned between said further rotary air expansion means and said enclosed space volume, so as to enable selective airflow therefrom to said rotary air expansion means or to atmosphere.

3. An environmental control system as claimed in claim 1 wherein said compression means consists of a single compressor that compresses ambient air and passes it through cooling structure then in part to said first air expansion means and in part to and through a temperature control valve, the expanded, cooled air from said expansion means thereafter joining and mixing with air in an outlet conduit from said temperature control valve.

4. An environmental control system as claimed in claim 1 wherein said compression means comprises two compressors, one of which compresses ambient air and passes it through cooling structure, then in part to the other compressor and in part to and through a temperature control valve.

5. An environmental control system as claimed in claim 4 wherein said other compressor further compresses said ambient air from said one compressor and, via said cooling means, delivers it to said first air expansion means which
5 then delivers the expanded, and thereby further cooled air, to an output conduit from and downstream of said temperature control valve, to mix with said air from said one compressor.

6. An environmental control system as claimed in claim 1
10 wherein all said air expansion means are turbine structures.

7. An environmental control system as claimed in claim 3 wherein said mixed air in said outlet conduit from said temperature control valve passes via water separation
15 apparatus into said enclosed space volume, and is then ejected to atmosphere or to said further expansion means.

8. An environmental control system as claimed in claim 1 wherein the enclosed space volume comprises the cabin of an aircraft.